

A NEW SPECIES OF ORNITHONYSSUS FROM THE  
WHITE-TAILED ANTELOPE SQUIRREL, WITH  
A REDIANOSIS OF THE GENUS  
ORNITHONYSSUS

(Acarina: Dermanyssidae)

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The genus *Ornithonyssus* Sambon previously has been characterized as having the dorsal plate entire. The new species described here has the dorsal armature divided into two plates, including a small pygidial plate near the caudal margin of the body, although agreeing in all other major features with typical members of *Ornithonyssus*. It first came to our attention through two female specimens collected in southern California in 1951. In early 1962, we collected large numbers of males, females, and protonymphs in the deserts of southern California.

In a recent paper, Dr. D. M. Allred (1962) referred to this species as an undescribed dermanyssid mite. We wish to express our appreciation to Dr. Allred for his kindness in making available to us the material he recorded from Nevada and an additional series collected in Utah. The Nevada material was collected in the course of a project supported by the U.S. Atomic Energy Commission. We also wish to thank Allan M. Barnes, California Department of Public Health, who provided mites from Inyo County, California.

Most other members of Macronyssinae with a divided dorsal plate in the female have the posterior plate large and extending over most of the opisthosomal length (*Steatonyssus* Kolenati, *Pellonyssus* Clark and Yunker, *Bewsiella* Domrow). *Ophionyssus* Megnin, with a separate pygidial plate, differs from the new species in the following characteristics: all setae nude; caudal setae with blunt tips; pygidial plate without setae; female with sternal plate bearing no more than two pairs of setae; epigynial setae on unarmed integument; male with anal plate separate from remainder of ventral armature and without lateral swelling on palpal femur; chelicera relatively short, with stout base and strongly tapered second segment.

Although the species in *Sauronyssus* Sambon originally were described as having the dorsal plate entire, Strandtmann and

Wharton (1958) indicate that a separate pygidial plate may occur. In *Sauronyssus*, the female always has a reduced sternal plate bearing only two pairs of setae; the male has a sternogenital plate and a separate anal plate; the male palpal femur lacks a lateral process.

The subfamily Dermanyssinae, considered by Krantz (1959) to contain a single genus, *Dermanyssus* Duges, includes several species with reduced female dorsal armature and some of these have a single pygidial plate. This subfamily is clearly distinguished from the Macronyssinae by the possession of greatly attenuated, needle-like chelicerae with minute chelae.

#### ORNITHONYSSUS Sambon, 1928

*Liponyssus* of authors, not Kolenati, 1856.

*Leiognathus* Canestrini, 1885 (Type: *Dermanyssus sylviarum* Canestrini and Fanzago), preoccupied by *Leiognathus* Lincecum, 1802.

*Bdellonyssus* Fonseca, 1941 (Type: *Leiognathus bacoti* Hirst, 1913)

*Neoichoronyssus* Fonseca, 1941 (Type: *Liponyssus wernecki* Fonseca, 1935), new synonymy.

*Fonsecanyssus* Radford, 1950 (Type: *Dermanyssus sylviarum* Canestrini and Fanzago).

Type species: *Dermanyssus sylviarum* Canestrini and Fanzago, 1877.

*Diagnosis*.—All idiosomal setae slender and acuminate; some, particularly caudal and marginal dorsal setae, with one to several small barbs. Legs moderately slender. Claws subequal. Coxae without ventral spurs or ridges other than normal sculpturing; coxa I rarely with proximal seta mounted on pedicel; anterior marginal spur of coxa II usually present, but typically very small.

*Female*.—Dorsal plate tapered posteriorly, leaving broad lateral areas of unarmed integument; rarely divided into podosomal and pygidial plates; bearing no more than 20 pairs of setae; without pair of minute setae anterior to terminal pair. Sternal plate with fine reticulate sculpturing over most of surface, but without other surface markings, specialized structures or heavily sclerotized bands; usually bearing three pairs of setae with third pair on posterior angles of plate; rarely with third pair on unarmed integument close to plate. Epigynial plate flared anteriorly, but without abrupt medial projection; tapering posteriorly to end in pointed or narrowly rounded tip; usually with pronounced median longitudinal thickening; bearing single pair of setae. Gnathosoma with narrow base. Hypopharyngeal processes relatively long, reaching at least to end of palpal genu and in some species to end of palp. Ventral surface of palpal trochanter usually with small, spur-like distal process. Chelicerae long and slender, not strongly tapered; chelae well developed but slender, without teeth or hook-like processes.

*Male*.—Ventral armature entire, at most slightly expanded posterior to coxae. Palpal trochanter without process. Palpal femur with prominent lateral

or ventrolateral swelling bearing stout seta.

The following species have characteristics corresponding with this diagnosis. Females are described for all, and males and proto-nymphs are known for six species.

- O. aridus* Furman and Radovsky, new species
- O. bacoti* (Hirst, 1913)
- O. banksi* Strandtmann and Wharton, 1958
- O. brasiliensis* (Fonseca, 1939)
- O. bursa* (Berlese, 1888)
- O. eruditus* (Fonseca, 1935)
- O. hirsti* (Fonseca, 1935)
- O. iheringi* (Fonseca, 1935)
- O. lutzi* (Fonseca, 1941)
- O. meprai* (Manso and Pletneff, 1951)
- O. monteiroi* (Fonseca, 1941)
- O. ondatrae* (Willmann, 1952)
- O. sylviarum* (Canestrini and Fanzago, 1877)
- O. vitzthumi* (Fonseca, 1941)
- O. wernecki* (Fonseca, 1935), new combination

We have seen specimens only of the three species commonly found in human environs (*O. bacoti*, *O. bursa* and *O. sylviarum*) plus *O. aridus* and *O. wernecki*. However, most of the descriptive literature has been available, including the excellent descriptions by Fonseca. *O. wernecki*, the type of *Neoichoronyssus*, has the proximal seta of coxa I mounted on a tuberculate process, but otherwise agrees with the diagnosis of *Ornithonyssus*. The alternative to inclusion in this genus would be retention of *Neoichoronyssus* as a monotypic genus separated from *Ornithonyssus* by a single characteristic. Other species which have been placed in *Neoichoronyssus* do not appear closely related to *Ornithonyssus*.

Certain hostal and geographic trends are apparent for the listed species. The principal hosts are small mammals, almost entirely rodents, except for *O. sylviarum* and *O. bursa* which occur on birds. The last two species with *O. bacoti* and *O. ondatrae* occur on hosts which have been widely dispersed by human activity. All of the others are known only from the New World. As Strandtmann and Wharton (1958, p. 200) have pointed out, the role of *O. bacoti* as vector of a filarial parasite of an American rodent, *Sigmodon hispidus*, suggests that this species has evolved in the Western Hemisphere.

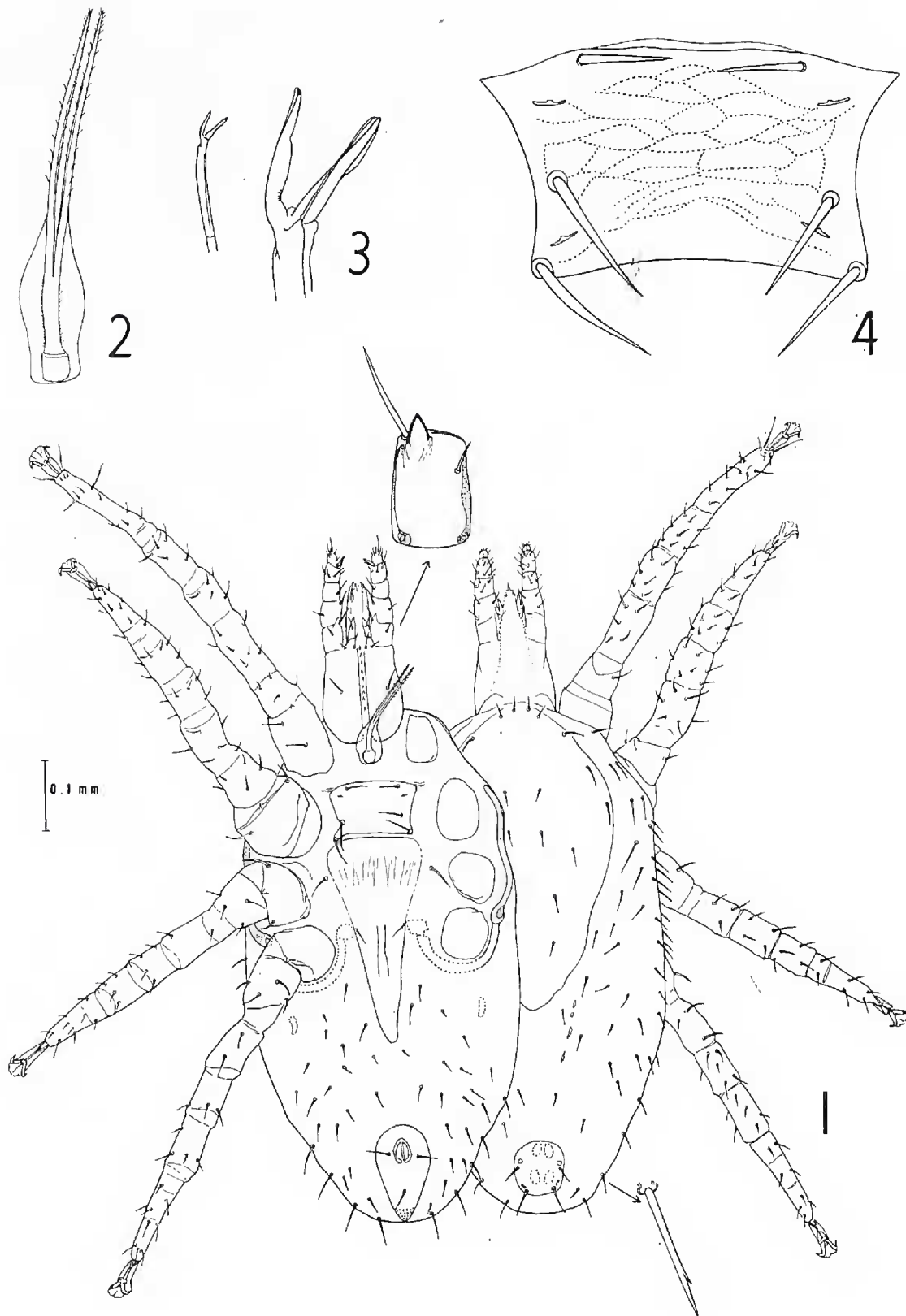
A number of species previously placed in *Ornithonyssus* are not included here. From their descriptions, none of these appears

to have slender, barbed setae and each has other characteristics indicating that it does not belong in *Ornithonyssus*.

***Ornithonyssus aridus* Furman and Radovsky, new species**  
(Figs. 1-7)

Division of the dorsal armature of the female into podosomal and pygidial plates differentiates this species from all others in the genus. Additional features of diagnostic value are relatively sparse setation, few barbed setae and these with a single barb about two-thirds of length from base; two stout dorsal setae on femur IV, adult peritreme terminating over middle of coxa II, and male dorsal plate narrow posteriorly.

*Female* (Figs. 1-4).—*Dorsum*: Podosomal plate widest over coxae II; strongly tapered near posterior margin; ending short distance behind coxae IV, with bluntly pointed tip; bearing 11 pairs of simple setae, including vertical pair, five lateral pairs and five submedian pairs; submedian setae subequal, somewhat shorter than laterals. Four pairs of weakly defined, linear sclerotizations form two converging rows posterior to podosomal plate. Pygidial plate located at level of posterior portion of anal plate (in unengorged specimens); subcircular in outline; bearing two pairs of submarginal setae; lateral setal pair located about midlevel of plate, with or without barb; posterior setal pair longer, barbed; one pair of small pores in front of lateral setae, one or two pairs in front of posterior setae. Oval areas of weaker sclerotization present on both dorsal plates; usually two pairs on pygidial plate. Setae on unarmed dorsum moderate in number; most caudal, some lateral and a few anteromarginal setae barbed; other setae nude and shorter. *Venter*: Tritosternum (Fig. 2) with subrectangular base narrowing abruptly to form long, slender neck region; laciniae long and slender, with fimbriae over most of length, becoming more numerous near tip; hyaline expansions present on each side of base, flaring out in neck region and gradually tapering to disappear some distance past separation of laciniae. Pre-sternal region without sculpturing, covered with striate integument. Sternal plate (Fig. 4) with anterior margin between first pair of setae straight, lateral margins concave, posterior margin nearly straight; first pair of setae shorter than other sternal setae, sometimes two-thirds their length or less; second pair of setae almost twice as far from first pair as from third. Epigynial plate with tip usually narrowly rounded, sometimes pointed; with strongly sclerotized longitudinal, median strip; trichopores of genital setae usually marginal. Anal plate with anterior margin strongly convex, caudal end bluntly pointed; margins strongly sclerotized, especially laterally; adanal setae arising about or slightly behind midlevel of anal ring. Metapodal plates weakly sclerotized, apparently subcuticular. Peritreme ending about midlevel of coxa II; no peritremal plate extending beyond tip of peritreme; weakly sclerotized remnant of anterior portion of plate, over parts of coxae I and II, visible on flattened specimens. Unarmed venter with moderate number of setae, nude except some setae near



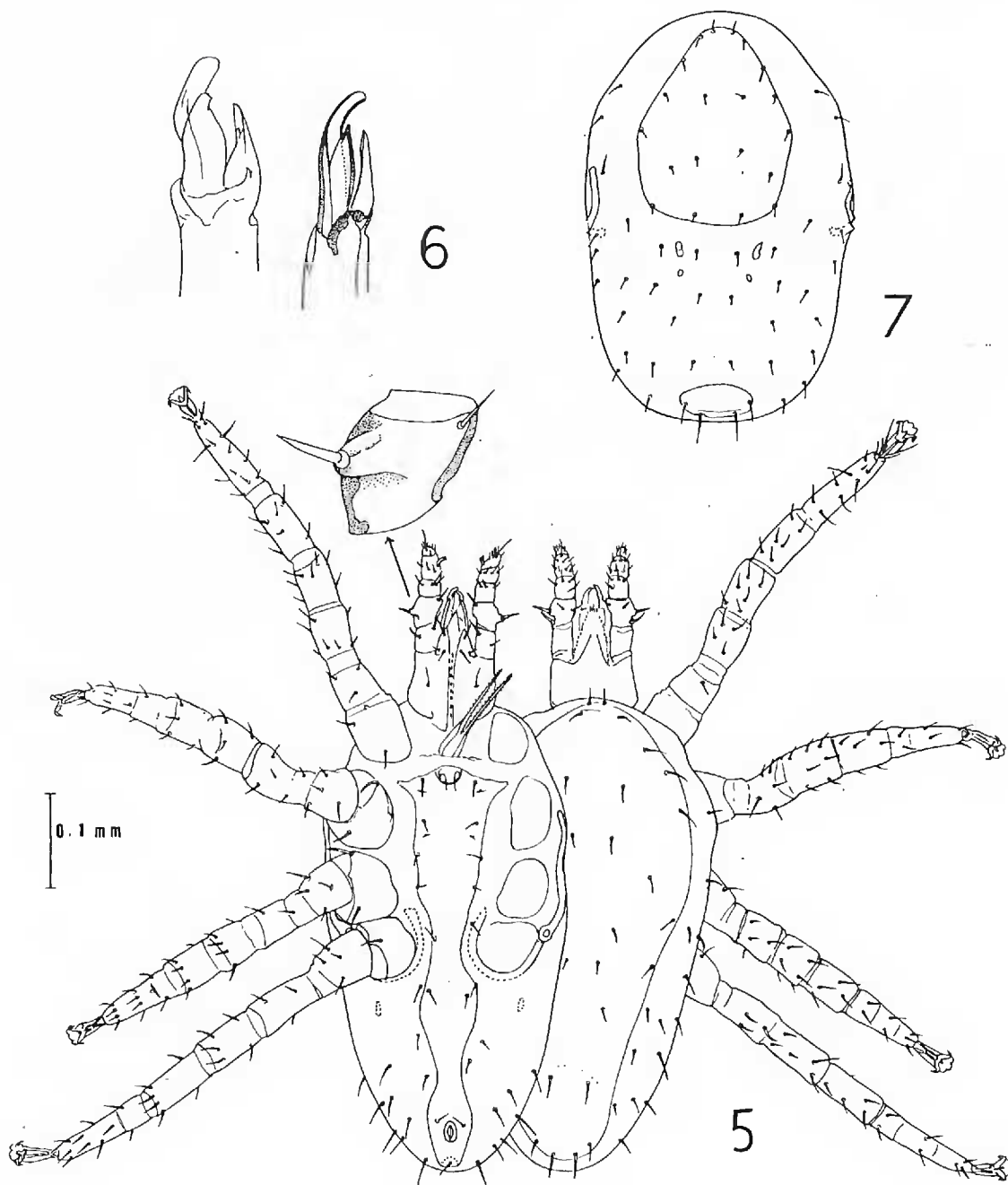
EXPLANATION OF FIGURES

*Ornithonyssus aridus*, female. Fig. 1. Ventral and dorsal views with enlargements of palpal trochanter and barbed seta. Fig. 2. Tritosternum. Fig. 3. Chelicera: to scale of Fig. 1 and enlargement of distal portion. Fig. 4. Sternal plate.

caudal margin with single, lateral barb. *Legs*: Anterior setae of coxae II and III and a few setae on more distal segments usually barbed. Anterior spur of coxa II arising somewhat dorsally, small, slender and inconspicuous, about 6-10 $\mu$  in length. Femur IV with two very stout setae. *Gnathosoma*: Deutosternal groove with about 10 teeth in single file. Tectum with acuminate tip and sparse lateral barbs. Hypopharyngeal processes ending slightly beyond base of palpal tibia. Palp with ventral process of trochanter short, bluntly pointed; seta arising at base of process very long; proximal seta of trochanter short and slender; femur with stout lateral seta and femur and genu each with stout ventro-medial seta; dorsomedial seta of genu flattened, with broad, hyaline tip. Chelicera (Fig. 3) about 225 $\mu$  from base of second segment to tip of fixed chela; maximum width less than 20 $\mu$ ; with strong dorsal notch near base of fixed chela. Fixed chela with hyaline margin distally. Movable chela with blunt tip bent slightly mediad; with membranous bursa arising dorsally near base, covering tip of chela and with sides meeting ventrally about one-third length from base. *Measurements* (10 specimens): Idiosomal length (unengorged) 680-730 $\mu$  (mean 702). Pygidial plate length 71-83 $\mu$  (mean 75). Pygidial plate width 66-78 $\mu$  (mean 70). Tarsus I length 119-139 $\mu$  (mean 127).

*Male* (Figs. 5, 6).—Barbed setae usually limited to a few caudal and marginal pairs, terminal pair on dorsal plate and anterior seta on coxa III. *Dorsum*: Dorsal plate extending nearly or quite to caudal margin of idiosoma; tapering strongly from level of coxae III, leaving much of opisthosoma unarmed; with rounded tip; sometimes with lateral constrictions near tip and suggestion of suture demarcating pygidial portion of plate; usually 16 pairs of setae, but varying from 15-18 pairs depending on number of pairs on tapering lateral margins; setae include vertical pair, four anterolateral pairs, two pairs near tip of plate. *Venter*: Holoventral plate with sternogenital region having nearly straight sides, without projections between coxae, except anterolateral angles projecting between coxae I and II; ventral region slightly expanded just posterior to coxae IV, strongly constricted to form narrow neck anterior to anal region; bearing usual sternal, metasternal, genital and anal setae; usually two or three setae on ventral region of plate. Unarmed integument with only about four or five pairs of setae, except for those on or very close to opisthosomal margin. Peritreme terminating about midlevel of coxa II. *Legs*: Similar to female except spur of coxa II anterior, not anterodorsal. *Gnathosoma*: Tectum, deutosternal teeth and hypopharyngeal length as in female. Palp with proximal seta of trochanter stout, inflated; lateroventral seta of femur stout, inflated, mounted on a prominent, incrassate pedicel; dorsomedial seta of genu stout and acuminate, unlike that of female. Chelicera (Fig. 6) about 120 $\mu$  from base of second segment to tip of spermatodactyl, stouter than in female. Movable chela with dorsal arm weak and only slightly hooked dorsad; spermatodactyl boat-shaped, blunt-tipped, curved dorsad. Fixed chela slightly shorter than dorsal arm of movable chela; tapering; with hyaline margin around tip. *Measurements* (10 specimens): Idiosomal length (unengorged) 497-545 $\mu$  (mean 520). Tarsus I length 111-123 $\mu$  (mean 118).

*Protonymph* (Fig. 7).—All plates lack sculpturing. Barbed setae usually restricted to pygidial plate and caudal margin. Tritosternum and legs as in adults. *Dorsum*: Podosomal plate bearing 10 pairs of setae including vertical pair, five lateral pairs and four submedian pairs; all setae moderate in length, anterolateral setae longest, second submedian pair shortest. Usual two pairs of platelets behind podosomal plate somewhat variable in shape, but typically anterior pair three-lobed and posterior pair ovoid. Pygidial plate with convexly arched anterior margin; lateral and posterior pairs of setae usually barbed, posterior pair longest; usually only two pairs of setae on plate, but



#### EXPLANATION OF FIGURES

*Ornithonyssus aridus*. Fig. 5. Male, ventral and dorsal views with enlargement of palpal femur. Fig. 6. Male chelicera, two views of distal portion. Fig. 7. Protonymph, dorsal view of idiosoma.

occasionally with pair of short, simple setae on anterior margin. Unarmed dorsum with about 18 pairs of setae. *Venter*: Sternal plate with blunt caudal tip. Anal plate with straight or very weakly convex anterior margin. Unarmed venter with four pairs of setae anterior to anal plate and four or five pairs lateral to anal plate or on caudal margin; caudal setae sometimes barbed. Peritreme slender, curving dorsad from spiracle, forming a dorsal arc and curving ventrad at termination approximately at level of anterior one-fourth of coxa III; about  $75\mu$  long, including spiracle. *Gnathosoma*: Similar to adult female except palpal trochanter without process or distal seta. Chelicera about  $140\mu$  long from base of second segment to tip of fixed chela. *Measurements* (10 specimens): Podosomal plate length  $193-216\mu$  (mean 204). Tarsus I length  $76-86\mu$  (mean 81).

*Holotype female*, allotype, paratypes including 30 females, 20 males and 20 protonymphs, from *Ammospermophilus leucurus leucurus* (Merriam), 5 MILES EAST OF MECCA, RIVERSIDE COUNTY, CALIFORNIA, 19 April 1962, D. P. Furman, B. Furman and F. J. Radovsky. Holotype, allotype and several paratypes deposited in the U.S. National Museum; one paratype of each sex and stage in British Museum (Natural History); remaining paratypes in collections of the authors. Other specimens identified as *O. aridus* all were taken on *A. leucurus*. The California and Nevada localities are within the range of *A. leucurus leucurus*. The Utah collecting site is close to the range limits of this and two other subspecies. Collections were made from adult and juvenile hosts of both sexes. California. 160 adults and 100 protonymphs, same data as type series; 8 protonymphs, Kramer Hills, 5 miles south Kramer Junction, San Bernardino County, 16 April 1962, D. P. Furman, B. Furman, and F. J. Radovsky; one female, Oro Grande, San Bernardino County, 25 October 1951, J. Poll; one female, 1 mile north Palo Verde, Riverside County, 8 November 1951; 9 females, 10 protonymphs, National Park Service Headquarters, Death Valley National Monument, Inyo County, 10 January 1962, D. Rohe. Nevada. Taken from total of 6 hosts, on U.S. Atomic Energy Commission Test Site, north of Mercury, Nye County, collected by D. M. Allred, 2 females, 26 August 1959; one female, 12 May 1960; one male, 25 August 1960; 4 females, 2 protonymphs, 22 and 23 May 1961. Utah. 3 females, 10 protonymphs, 1 mile east Veyo, Washington County, D. E. Beck.

The collecting records indicate that *O. aridus* is a specific parasite of a desert-inhabiting squirrel, *Ammospermophilus leucurus*. The specimens that we collected were recovered by briefly expos-



ing the dead hosts to chloroform vapor and then washing them in a detergent solution. No mites of this species were recovered from *Perognathus*, *Dipodomys*, and *Onychomys* taken at the same time and vicinity and treated in the same way.

The type locality, a few miles north of the Salton Sea, is in a particularly barren region with steep, rocky ridges separated by flat, sandy and sparsely vegetated ravines. Here, over 200 adults and 120 protonymphs were taken on seven squirrels, mostly juveniles, from one night's trapping.

#### NOTE ON PREPARATION OF MATERIALS

The various water-miscible preparations used for mounting mites each contains a clearing substance, and frequently specimens can be mounted directly from alcohol with excellent results. However, the ease of this procedure may cause workers to neglect pre-mounting treatments which sometimes are necessary for satisfactory study material. Most of the specimens of *O. aridus* had a black residue in the gut and their legs were strongly flexed. Specimens in the large series from the type locality also were heavily coated with fine particles of dust and debris. Direct mounting did not solve these problems, and the following procedure was the most satisfactory attempted.

Specimens were transferred to glycerine and vigorously shaken in a vial, which removed most of the adhering particles. After being returned to alcohol, they were placed in 10 per cent potassium hydroxide. Treatment in this solution for one to two hours at room temperature cleared the dark material in the gut without overclearing the specimens. After neutralization in acid-alcohol for a brief period, the mites were left overnight in lactophenol for additional clearing. A final brief cleansing of the mites was accomplished after placing them in Hoyer's medium, where use of a fine needle facilitated removal of remaining debris. The legs soon extended when specimens were mounted from lactophenol and slides were heated on a plate at 70° C.

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## A NEW SPECIES OF APACHE FROM CALIFORNIA

(Homoptera:Derbidae)

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In 1957 several specimens of the otiocerine genus *Apache* were collected in different types of fruit fly traps used by the California Department of Agriculture. These specimens were found to differ from other known species of this genus.

Specimens were trapped in California only in Solano County in 1957, but during 1958 they were found in Colusa, Glenn, Lake, Placer, Sacramento, Tehama, Yolo and Yuba counties, and in 1959 a single specimen was collected from San Luis Obispo County.

The major insect collections of the western United States were canvassed to see if specimens of this species were present. None were found outside of California. Several specimens were found in the University of California collection at Davis, dating back to 1953, from the counties of Shasta and Tehama. These were all collected in light traps of some type. One specimen was in the collection of the California Academy of Sciences, collected by E. P. Van Duzee at Cazadero, Sonoma County in 1918, and a single male was found in the collection of the California Insect Survey, University of California, Berkeley. This specimen was collected at Orangevale, Sacramento County, August 9, 1938, by Quentin Tomich.

Eight specimens (2 ♂♂ and 6 ♀♀) in the collection of the University of British Columbia, determined as *Apache degeeri* Kirby from various locations in British Columbia, were checked and found to be *degeeri*. These represent the only records of this species west of the Rocky Mountains as far as is known.

Considerable effort has been made to find the host association of the new species. To date this has been unsuccessful. In the eastern part of the United States, other members of the Otiocerini have